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SPECIFICATION

APPARATUS HAVING MEANS FOR READJUSTING AT LEAST ONE OPERATING PARAMETER

A multitude of currently obtainable apparatus are equipped with display devices with whose assistance settings can be made at the apparatus and modified upon employment of an input ^{device} means such as, for example, a keyboard. Examples of such apparatus are communication terminal equipment, particularly mobile radio telephone communication terminal equipment. For physical reasons, these display devices are subject to aging processes that make a readjustment of the supply voltage of such display devices necessary, particularly given liquid crystal displays.

There is thereby the possibility that the user undertakes a readjustment from ignorance or mistakenly that leads to the unuseability of the display means. The problem then arises that a further implementation or modification of settings at the apparatus is practically no longer possible since the entire user prompting and answer back of such modifications or settings would have to ensue over what is now an unuseable display. As a result, the user is practically dependent on the assistance of a service technician of his apparatus manufacturer in such a case.

There is a rather similar situation given completely different apparatus that have operating parameters available to them that must be occasionally readjusted. Here, too, there is the risk that an apparatus condition wherein specific risks can arise or from which the user can no longer escape by himself by readjustment is set as a result of improper setting and readjustment of operating parameters.

In order to avoid these problems, the invention provides an apparatus with means for readjustment of at least one operating parameter comprising the features of claim 1. SUMMARY OF THE INVENTION

In order to prevent a readjustment of operating parameters of an apparatus into inexpedient ranges or to at least make this more difficult, the invention provides that the readjustment be limited by a value interval whose

average adapts to the momentary value of the operating parameter. As a result thereof, it is particularly the readjustment of operating parameters that are subject to modifications due to aging or slow environmental influences that is simplified. This is advantageous particularly when the readjustment relates to an operating parameter of a display means, for example, the supply voltage of a chromatic LCD display, because what is thereby prevented in practice is that a user makes the display means unusable due to improper readjustment.

The inventive solution develops corresponding and similar advantages in other apparatus whose operating parameters must be readjusted.

A² The invention is described below on the basis of preferred exemplary embodiments.

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The invention proceeds on the basis of an apparatus that has means available to it for readjusting at least one operating parameter of this apparatus. These can be analog controllers or input keys with which the values of a parameter can be modified dependent on the duration of or the number of times the key is pressed. The invention then provides that the readjustment of an operating parameter or of a plurality of operating parameters is limited by a value interval that is defined by an interval width and by an average.

The possible parameter values available for the readjustment thus lie within a value interval that extends within an interval width around an average. The smallest parameter value available for readjustment is thus the average diminished by half the interval width, and the greatest operating parameter value available for readjustment is the average increased by half the interval width. *Preferably*, the interval width of a value interval and the average are stored in the apparatus. The interval width *can* thereby be stored in a memory means specifically provided for this purpose or can be stored as a parameter of a software.

In order to then assure that the position of the value interval can adapt to the modified requirements given aging of the apparatus or of a component part of the apparatus which makes a readjustment of operating parameters

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necessary, the invention provides that the average of a value interval or the averages of a plurality of value intervals be stored such in a memory means of the apparatus that it is possible to overwrite the stored averages or the stored average with momentary parameter values.

5 Given slow changes of the conditions, this measure makes it possible to undertake a corresponding adaption of the position of the value interval, so that, despite the modification due to aging or due to environmental influences, it is ultimately always possible to set the required parameter values. At the same time, however, what is prevented is that parameter values that are significantly too high or significantly too low are unintentionally set.

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Put in other words, one could speak of what is referred to as a sliding window (value interval) within which it is possible to adjust operating parameter values with continuous variation or by a few steps. It is thus not possible to depart from a meaningful or allowed range of the parameter values. Given the apparatus with a display means, in particular, it is thereby assured that an adjustment of the supply voltage of the display which makes reading of the display impossible cannot occur.

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It is then provided in a preferred embodiment of the invention that the momentary parameter value is utilized as new average of the value interval, i.e. as new center of the value window. An extremely great range of adjustment (balancing range) can thus be realized over the useful life without rendering the display unuseable due to improper operation.

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This is particularly important given color LCD displays since, in this case, the aging process dependent on environmental conditions such as, for example, the temperature can lead to a more or less pronounced color change. This can ultimately lead to unreadability of the display. As a result of the invention, a corresponding voltage balancing is implemented such that the color change can be always in turn reversed without creating the risk that the display becomes temporarily or permanently unreadable due to a faulty operation or misadjustment of the readjustment.

In its basic form, the invention ~~thus~~ provides an apparatus with ~~means~~ ^a for readjustment ~~of~~ ^{mechanism for} at least one operating parameter, whereby a value interval whose average is stored in a memory ~~means~~ ⁱⁿ of the apparatus is available for the readjustment of an operating parameter, ~~whereby~~ ^{such that} the stored value can be overwritten with the momentary value of the operating parameter ^{as} as a result ~~whereof~~, following a renewed readout of the stored average, the new value thereof defines the position of the value interval.

According to a preferred embodiment of the present invention, an average set at the factory is additionally stored invariably in the apparatus, and the momentarily stored average can be overwritten with the average set at the factory ^{As such}, ~~so that~~, following a renewed readout of the stored average, the average set at the factory defines the position of the value interval.

Particularly given apparatus having a display ~~means~~ whose operating parameters must be readjusted, a further preferred embodiment of the ~~present~~ invention is especially advantageous in accord wherewith the influence of the readjustment of the supply voltage of the display ~~means~~ ^{device} can be observed by the user during the readjustment because a test image is displayed on the display ~~means~~ ^{device} during the readjustment.

In this context, a specific embodiment of the ~~invention~~ is especially advantageous when the display is chromatic, in accord wherewith the test image shows areas or objects having different colors during the readjustment, the chromatic values thereof being modified by the readjustment.

An especially advantageous operation of the apparatus derives when stored averages are overwritten with momentary values of corresponding operating parameters when it is shut off, so that the values thereof are read out as new averages when the apparatus is turned on again.

The only thing to be provided for ^{effecting} realization ^{present} of the ~~invention~~ is a memory possibility for the averages of value intervals in an apparatus, whereby ⁱⁿ the possibility is to be provided that, dependent on the embodiment of the ~~invention~~, these stored values are overwritten with the momentary parameter values dependent on specific use or operating actions or by

turning the apparatus off. Dependent on the embodiment of the ^{present} invention, it is then provided that the new averages potentially stored at the moment in the apparatus are read out and employed as new averages of a value interval when the apparatus is turned on again.

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